D.P.U. 93-101

In the Matter of the Joint Petition of New England Power Company and Massachusetts Electric Company pursuant to c. 40A, § 3, for Department approval of an exemption from the operation of the zoning ordinance of the Town of Spencer for the replacement of existing electric substation equipment and the construction, operation, and maintenance of additions to the existing electric substation.

APPEARANCE: Kathryn J. Reid
New England Power Company
25 Research Drive
Westborough, MA 01582-0099
FOR: NEW ENGLAND POWER COMPANY
Petitioner

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I. INTRODUCTION

On May 11, 1993, New England Power Company ("NEPCo") and its affiliate, Massachusetts Electric Company ("MECo"), collectively referred to as the "Companies" or "petitioners", filed a joint petition with the Department of Public Utilities ("Department") for an exemption from the zoning by-laws of the Town of Spencer. In their petition, the Companies state that they seek a zoning exemption in order to construct and operate proposed additions to MECo's existing Meadow Road substation No. 552 ("Meadow Road substation" or "substation") which is located on a 1.82-acre parcel of land owned by the Companies, and situated on the westerly side of Meadow Road in Spencer, Massachusetts. The petition was docketed as D.P.U. 93-101.[1]

The affected parcel of land is zoned for residential use, and does not permit the uses proposed by the Companies (Exh. NEP/MEC-1, at 2-3).[2] Accordingly, the Companies requested exemptions from the following sections and subsections of the Spencer zoning

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[1] The Companies' responses to the Department's information requests DPU 1-1 through DPU 1-8 and DPU 2-1 through DPU 2-5 are hereby marked for identification as Exhibits DPU-1 through DPU-13, respectively, and, on the Department's own motion, moved into evidence. The Companies' exhibits, marked for identification as Exhibits NEP/MEC-1 through NEP/MEC-11 are moved into evidence on the Department's own motion.

[2] The Companies indicated that a portion of the affected parcel is located within an R-22.5 Open Residence District, and the remaining portion is located within an R-45 Rural Residence District (Exh. NEP/MEC-1, at 3). The Companies also indicated that "public utility property" is not a permitted use in either district, requiring a special permit from the Zoning Board of Appeals (Exh. NEP/MEC-6).

by-laws: (1) Section 4 (Nonconforming building and uses), Subsection 4.1.2 (Requirement for Special Permit); (2) Section 5 (Use Regulations); and (3) Section 13 (Aquifer Protection Overlay District) (Exhs. NEP/MEC-5; NEP/MEC-6).

The petitioners are public service corporations and are electric companies as defined under G.L. c. 164, § 1, and are authorized to generate, transmit, purchase, sell, and distribute electricity (Exh. NEP/MEC-1, at 1).[3]

II. PROCEDURAL HISTORY

Pursuant to notice duly issued, the Department conducted a public hearing in Spencer on June 29, 1994 to afford interested persons an opportunity to be heard. No petitions for leave to intervene were filed.

In support of its petition, the Companies sponsored the testimony of three witnesses: Robert D. Galgano, P.E., distribution planning engineer in the District Engineering Department of MECo; Donald R. Shapleigh, principal engineer in the Distribution Substation Engineering Department of New England Power Service Company ("NEPSCo"); and Lawrence G. Union, Jr., account manager at MECo.

The evidentiary record includes 24 exhibits. The Department entered thirteen of its own exhibits into the record, consisting of responses from the Companies to Department information requests. The Department also entered eleven exhibits into the record that were submitted by the Companies at the public hearing.

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[3] MECo is an affiliate of NEPCo (Tr. at 10). MECo provides retail electric service to customers in Spencer and the surrounding communities (id. at 11).

III. STANDARD OF REVIEW

In their petition for a zoning exemption, the Companies seek approval under G.L. c. 40A, § 3, which, in pertinent part, provides:

> Land or structures used, or to be used by a public service corporation may be exempted in particular respects from the operation of a zoning ordinance or by-law if, upon petition of the corporation, the [D]epartment of [P]ublic [U]tilities shall, after notice given pursuant to section eleven and public hearing in the town or city, determine the exemptions required and find that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public...

Under this section, the Companies first must qualify as public service corporations (see Save the Bay, Inc. v. Department of Public Utilities, 366 Mass. 667 (1975)), and establish that they require an exemption from the local zoning by-laws. The Companies then must demonstrate that the present or proposed use of the land or structure is reasonably necessary for the public convenience or welfare.

In determining whether a company qualifies as a "public service corporation" for purposes of G.L. c. 40A, § 3, the Supreme Judicial Court has stated:

> among the pertinent considerations are whether the corporation is organized pursuant to an appropriate franchise from the State to provide for a necessity or convenience to the general public which could not be furnished through the ordinary channels of private business; whether the corporation is subject to the requisite degree of governmental control and regulation; and the nature of the public benefit to be derived from the service provided.

Save the Bay, supra, at 680.

In determining whether the present or proposed use is reasonably necessary for the public convenience or welfare, the Department must balance the interests of the general public against the local interest. Id. at 685-686; Town of Truro v. Department of Public Utilities, 365 Mass. 407 (1974). Specifically, the Department is empowered and required to

undertake a "broad and balanced consideration of all aspects of the general public interest and welfare and not merely [make an] examination of the local and individual interests which might be affected." New York Central Railroad v. Department of Public Utilities, 347 Mass. 586, 592 (1964). When reviewing a petition for a zoning exemption under G.L. c. 40A, § 3, the Department is empowered and required to consider the public effects of the requested exemption in the State as a whole and upon the territory served by the applicant. Id.; Save the Bay, supra, at 685.

With respect to the particular site chosen by a petitioner, G.L. c. 40A, § 3 does not require the petitioner to demonstrate that its preferred site is the best possible alternative, nor does the statute require the Department to consider and reject every possible alternative site presented. Martorano v. Department of Public Utilities, 401 Mass. 257, 265 (1987); New York Central Railroad, supra, at 591; Wenham v. Department of Public Utilities, 333 Mass. 15, 17 (1955). Rather, the availability of alternative sites, the efforts necessary to secure them, and the relative advantages and disadvantages of those sites are matters of fact bearing solely upon the main issue of whether the preferred site is reasonably necessary for the convenience or welfare of the public. Id.

Therefore, when making a determination as to whether a petitioner's present or proposed use is reasonably necessary for the public convenience or welfare, the Department examines (1) the need for, or public benefits of, the present or proposed use (see New England Power Company, D.P.U. 92-278/279/280, at 19-22 (1994) ("NEPCo, D.P.U. 92-278/279/280"); New England Power Company, D.P.U. 92-270, at 17 (1994) ("NEPCo, D.P.U. 92-270"); Tennessee Gas Pipeline Company, D.P.U. 85-207, at 6-9 (1986)

("Tennessee")); (2) the present or proposed use and any alternatives identified (see NEPCo, D.P.U. 92-278/279/280, supra, at 19; NEPCo, D.P.U. 92-270, supra, at 17; Tennessee, supra, at 18-20); and (3) the environmental impacts or any other impacts of the present or proposed use (see NEPCo, D.P.U. 92-278/279/280, supra, at 20-23; NEPCo, D.P.U. 92-270, supra, at 17-20; Tennessee, supra, at 20-25).

After examining these issues, the Department balances the interests of the general public against the local interest and determines whether the present or proposed use is reasonably necessary for the convenience or welfare of the public.[4]

IV. DESCRIPTION

A. Need for the Proposed Project

The Companies stated that the proposed project would improve reliability in the Spencer area by enabling the distribution system to operate within its capabilities at all times, and, accordingly, is reasonably necessary for the convenience and welfare of the public (Exhs. NEP/MEC-3, at 3-5; NEP/MEC-2, at 5; DPU-3).

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[4] In addition, the Massachusetts Environmental Policy Act provides that "[a]ny determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." G.L. c. 30, § 61. Pursuant to 301 C.M.R. § 11.01(3), these findings are necessary when an Environmental Impact Report is submitted by a company to the Secretary of Environmental Affairs, and should be based on such Environmental Impact Report. Where an Environmental Impact Report is not required, c. 30, § 61 findings are not necessary. 301 C.M.R. § 11.01(3).

The record indicates that no Environmental Impact Report was required for the proposed project (Exh. DPU-2).

The Companies' witness, Mr. Galgano, stated that the Spencer area is presently supplied by five connecting sections of 69 kilovolt ("kV") overhead transmission lines (Exh. NEP/MEC-3, at 2). Mr. Galgano stated that some of the 69 kV transmission voltage is stepped down to 13.2 kV distribution voltage via a 7.5/9.375 MVA transformer at the Meadow Road substation, and distributed via a single 13.2 kV feeder extending from the substation (id., attachments RDG-3 through RDG-6). At present, the Town of Spencer also receives power from two 13.2 kV distribution feeders emanating from the Lashaway substation in North Brookfield, Massachusetts, and from two 13.8 kV distribution feeders extending from the Leicester substation in Leicester, Massachusetts (id.).

Mr. Galgano stated that the proposed upgrade at the Meadow Road substation encompasses both the upgrade of the existing 13.2 kV facilities, as well as rebuilding the existing 69 kV switchyard (Exh. NEP/MEC-3, at 2). Mr. Galgano stated that the upgrade of the 13.2 kV facilities was identified in the 1990 Leicester/Auburn/Webster/Spencer area supply study ("LAWS study") conducted by NEPSCo (id., att. RDG-11). Mr. Galgano stated that the LAWS study projected that normal peak load on the single 13.2 kV distribution feeder emanating from the Meadow Road substation would exceed the capability of the feeder in 1993 (id.).[5] Mr. Galgano further stated that the need for upgrading the 13.2 kV facilities was again identified in a study by MECo, the 1993 Spencer Area Distribution Study, which projected 1994 as the year during which winter peak load would exceed capabilities on the single 13.2 kV feeder at the Meadow Road substation

[5] The petitioners, being part of the New England Electric System Companies ("NEES"), utilize NEES supply planning guidelines to ensure that facility loadings are kept within capabilities at all times (Exh. NEP/MEC-3, at 2).

(Exh. NEP/MEC-3, at 2, att. RDG-12).[6] The Companies maintained that the upgrade of the existing 13.2 kV facilities at the Meadow Road substation would relieve loading on the distribution feeders in the Spencer area, allowing them to operate within their capabilities (id. at 3).

The Companies provided data showing that winter peak load for the Spencer area increased at an average rate of 5.9 percent between the years 1986 through 1993 (id. at 2, att. RDG-1).[7] The Companies estimated that growth in winter peak load for the years 1993 through 2005 would be 1.1 percent annually (id.).[8]

With respect to the 69 kV portion of the proposed upgrade, the Companies stated that the need for rebuilding the 69 kV switchyard at the Meadow Road substation was identified in a 1992 NEPSCo memo (id., att. RDG-13). The Companies further stated that, in addition to being a distribution substation, the Meadow Road substation is also a switching substation for five connecting sections of 69 kV transmission line used to supply the Spencer area (Exh. NEP/MEC-3, at 3). Two of the 69 kV transmission line sections connect the Meadow Road substation to the Leicester substation, identified as E-5 and F-6, and two 69 kV line sections connect the Meadow Road substation to the Lashaway substation (also identified as E-5 and F-6) (id.). The remaining 69 kV line (T-20) serves as a backup supply for the

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6 The Companies stated that during the winter of 1991/92, the peak load on the single 13.2 kV distribution feeder identified as line 552L1 was 581 amperes, which exceeded the feeder's winter-normal rating of 575 amperes, as well as the winter-emergency rating of 580 amperes (Exh. NEP/MEC-3, att. RDG-12, at 3-4).

7 Winter peak load increased from 30.7 MW in 1986 to 44.0 MW in 1993 (Exh. NEP/MEC-3, att. RDG-1).

8 The Companies project a winter peak load of 44.4 MW in 1994 to 50.1 MW in 2005 (Exh. NEP/MEC-3, att. RDG-1).

Town of Webster (id.). The Companies further stated that the existing 69 kV switchyard facilities include condemned wood poles,[9] deteriorated wood structures in the switching platforms, rusted and broken guy wires, and deteriorated 69 kV circuit breakers (id.). The Companies added that because some of this equipment was originally installed in the 1930's, some spare parts are no longer available, making maintenance difficult (id.).

B. The Proposed Project and Alternatives

The Companies requested a zoning exemption from the Department to upgrade the existing Meadow Road substation, through the construction, maintenance, and operation of additions ("proposed substation upgrade") (Exh. NEP/MEC-1, at 1). The Companies stated that the proposed substation upgrade would consist of three separate phases of construction (id. at 1; Exhs. NEP/MEC-2, at 2-3, att. DRS-1; NEP/MEC-3, at 1-5; DPU-3, attachments). Initially, the Companies would: (1) upgrade the existing single 13.2 kV distribution feeder extending from the Meadow Road substation to on-road distribution lines; (2) install an additional 13.2 kV feeder extending to on-road distribution lines in order to provide for increasing load; (3) remove the old 69 kV switching equipment, including the condemned poles, and replace them with modern equipment, including metal support structures for accomodating the five connecting sections of 69 kV transmission lines; (4) add a new 13 kV tie point structure to accommodate additional distribution feeders; (5) expand the existing

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9 During testimony, Mr. Galgano defined a "condemned pole" as a pole that requires replacement as a result of it being at the end of its service life (Tr. at 57). Mr. Galgano stated that MECo has an inspection program whereby poles are tested for soundness and decay (id. at 58). Mr. Galgano added that when a pole is identified as requiring replacement, it is tagged as condemned (id.).

fenced area[10] on the Companies' parcel of land; (6) replace the existing 69 kV to 13.2 kV, 7.5/9.375 MVA transformer with a low-noise 69 kV to 13.2 kV, 24/32/40 MVA transformer; and (7) install a 20 foot by 20 foot building to contain relays and substation service equipment (collectively "phase one" or "first phase") (id.; Tr. at 18-19). The Companies' witness, Mr. Shapleigh, testified that first-phase construction would likely commence approximately nine months following a Department approval, and require an additional seven to eight months for completion (Tr. at 20).

The Companies stated that the subsequent installation of a third 13.2 kV feeder would be required to accomodate an additional increase in load expected to occur by the year 2000 ("phase two" or "second phase") (Exh. DPU-3). The Companies stated that eventually an additional 69 kV to 13.2 kV, 24/32/40 MVA transformer[11] -- with up to three additional 13.2 kV feeders[12] -- would be required to accomodate an additional increase in load

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[10] The Companies indicated that, following expansion to accomodate the new equipment, the fenced area would be 265 feet by 165 feet (43,725 square feet) (Tr. at 18).

[11] With respect to the timing for installation and operation of the second transformer, the Companies stated that their supply planning criteria require the provision of a firm supply when the peak load in a contiguous area exceeds 30 MW (Exh. DPU-3). The Companies defined a supply as "firm" if the loss of a single element will not cause a loss of load for a time longer than that required to enable automatic switching (id.). The Companies explained that because peak load at the Meadow Road substation is expected to be 16.3 MW following the completion of the first phase of the proposed substation upgrade, only a single transformer would be required (id.). The Companies added that the second transformer would be installed when the peak load at Meadow Road substation exceeds 30 MW -- which the Companies predict to occur in the year 2010 (id.).

[12] The Companies projected the necessity of a third 13.2 kV distribution feeder at the Meadow Road substation in the year 2000, a fourth in the year 2010, a fifth in the year 2018, and a sixth in the year 2024 (Exh. DPU-3).

predicted to occur by the year 2010 (collectively "phase three" or "third and final phase") (id.).

The Companies indicated that the first phase of the proposed substation upgrade would increase the potential 13.2 kV capacity of the Meadow Road substation from 9.375 MVA at present to 40 MVA (Exh. NEP/MEC-2, at 2-3). The Companies stated that the proposed site was chosen because it has been in continuous use as a substation since the 1930's, is presently served by five connecting sections of 69 kV transmission line, is centrally located, and would allow for upgrading with a minimal impact to the environment (Exh. NEP/MEC-3, at 4).[13]

The Companies studied three alternatives to the proposed substation upgrade, including two alternatives which would address the increasing 13.2 kV load, and one which would address the aging 69 kV switching equipment (id.). Under one of the 13.2 kV alternatives, a second 69 kV to 13.2 kV, 7.5/9.375 MVA transformer would be installed at the

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[13] The Companies stated that their long-range plan to supply the greater Spencer-Leicester-Brookfields-Oakham-New Braintree area incorporates continued reliance upon the E-5 and F-6 69 kV transmission line sections for supplying substations in Leicester, Spencer and North Brookfield (Exh. DPU-4). The associated 13 kV distribution systems would be expanded as required to serve load growth (id.). The Companies explained that the Meadow Road substation is centrally located, and added that the Leicester and Lashaway substations are presently operating at their limits (id.). The Companies stated that increasing the capacity of the Meadow Road substation would allow the electrical load at the Leicester and Lashaway substations to be reduced to within their respective capabilities (id.).

The Companies also stated that the Meadow Road substation would be used to supply load growth in Spencer, and would likely be used to supply future load growth in Leicester, the Brookfields, Oakham, and New Braintree (id.). The Companies further stated that the alternative to using the Meadow Road substation would be to increase the capacity of the Leicester and/or Lashaway substations (id.).

Meadow Road substation along with an additional set of 13.2 kV regulators and associated equipment (id.). The Companies indicated that under the other 13.2 kV alternative, the existing transformer would be replaced with a 69 kV to 13.2 kV, 15/20/25 MVA transformer – presently available from another MECo substation – along with two circuit breakers, two regulators and associated equipment (id.). Under the 69 kV alternative, the existing 69 kV switchyard would be rebuilt in kind by replacing the condemned poles, replacing the three 69 kV circuit breakers, and installing airbreak switches to replace the 69 kV disconnect switches (id.).

The Companies stated that the proposed substation upgrade was selected based on reliability, distribution line loss savings, distribution capacity gains and economics (Exh. NEP/MEC-3, at 4, att. RDG-13).[14]

C. Impacts of the Proposed Project

In accordance with its responsibility to undertake a broad and balanced consideration of all aspects of the general public interest and welfare, the Department examines the impacts associated with the proposed project to identify any significant impacts that would likely occur during construction and operation of the proposed substation upgrade.

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[14] The Companies indicated that while the proposed substation upgrade was not the least expensive when compared to the alternatives, over twice the transformer capacity would be obtained from the chosen plan for an additional and incremental cost of $100,000 (Exh. NEP/MEC-3, att. RDG-13).

1. Construction and Traffic

The Companies stated that while normal construction hours at the Meadow Road substation would be from 7:30 a.m. to 4:00 p.m., there would be occasions when additional work time is required to accomodate construction contingencies (Tr. at 52). However, the Companies added that such instances requiring additional work would be a very small portion of the total construction time required to effectuate the proposed substation upgrade (id.).

The petitioners acknowledged that during construction, an increase in traffic flow would occur in the vicinity of the Meadow Road substation (Exh. DPU-7).[15] The petitioners stated that there would be some construction equipment moving in and out of the substation property, and added that, following commencement, construction of the first phase would last up to eight months (id., Tr. at 20).

2. Electric and Magnetic Fields ("EMF")[16]

The Companies stated that, following completion of phase one of the proposed substation upgrade, the magnetic field levels at the perimeter of the substation fence would be reduced from an existing maximum of 61 milligauss ("mG") to a maximum of 22 mG, despite an increase in facility loading (Exh. NEP/MEC-3, at 5; Tr. at 25). The Companies

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[15] The petitioners stated that during construction of the first phase of the proposed substation upgrade, approximately six to eight personnel vehicles or light trucks would enter and leave the Meadow Road substation daily (Exh. DPU-7). To support construction, the petitioners added that an average of one to two medium-sized trucks are expected daily to deliver construction materials (id.).

[16] The Department notes that because no changes in voltage levels are planned on either the transmission or distribution lines in the vicinity of the Meadow Road substation, no significant changes in electric field levels, as a result of the proposed substation upgrade, are likely.

stated that such a reduction in magnetic field levels would be attributed to the relocation of the new transformer and 13.2 kV distribution bus structure from the northern side of the existing substation fence to the center of the expanded substation (id.).

The petitioners provided calculations indicating the estimated magnetic field levels at several locations along the perimeter of the substation fence both before and after implementation of all three phases of the proposed substation upgrade (Exh. DPU-13, attachment B1).[17] Under the first phase, calculations ranged from 1 mG to 22 mG, generally representing a reduction in magnetic field levels from those which presently exist (id.).[18]

Under the second phase of the proposed substation upgrade, calculated magnetic field levels along the fence perimeter ranged from 2 mG to 39 mG, with the highest expected level at the center of the easterly side of the substation fence, a point from where the 13.2 kV distribution lines would exit overhead (Exhs. NEP/MEC-8; NEP/MEC-3, at 5; Tr. at 48-50).

In response to a Department request, the Companies provided estimates of magnetic field levels following implementation of the first phase, collectively considering area

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[17] The Companies indicated that the calculations of magnetic field levels were based on actual projected line loads, as opposed to conductor capacities of the transmission or distribution lines (Exh. DPU-11).

[18] The petitioners indicated that the only expected increase in magnetic field levels (from 9 mG to 16 mG) -- as a result of substation component reconfiguration -- would occur on the westerly side of the Meadow Road substation fence, a direction opposite from any nearby residences or commercial buildings (Exh. DPU-13, attachment B1).

overhead transmission[19] and distribution lines, at residences and businesses up to 1,200 feet from the substation property line (Exh. DPU-6, attachment A1). Mr. Galgano indicated that increased loading on existing overhead 13.2 kV distribution lines -- as a result of the proposed substation upgrade -- would increase the magnetic field level from 1.5 mG to 4.0 mG at the closest residence which is located on West Main Street (Exhs. NEP/MEC-8; NEP/MEC-3, at 5; DPU-6; Tr. at 48-50). The Companies' estimates further indicated that magnetic field levels would increase from 1.5 mG to 4.0 mG at two businesses also located on West Main Street -- the largest such increase at any area business (Exh. DPU-6, attachment A1).[20,21]

The Companies stated that the existing 13.2 kV distribution line extending southwesterly along West Main Street from the Meadow Road substation would be reconductored with spacer cable[22] to accomodate increased loading thereon (id.). The Companies indicated that spacer cable construction – which utilizes close spacing of the conductors – achieves superior magnetic field cancellation between the electrical phases

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19 The Companies indicated that the overhead 69 kV transmission lines would have a negligible effect on the magnetic field impacts associated with the phase one portion of the proposed substation upgrade (Exh. DPU-6).

20 The Department notes that the Companies did not provide additional estimates of phase two magnetic field levels that considered the combined effects of area transmission and distribution lines near residences and businesses up to 1,200 feet from the substation property line.

21 At other locations along streets in the vicinity of the Meadow Road substation, the Companies' estimates indicated that magnetic field levels would remain the same or decrease (Exh. DPU-6, attachment A1).

22 The Companies stated that spacer cable construction is MECo's standard overhead distribution line construction technique utilized for heavily treed areas (Exh. DPU-6).

present on the line, as compared to that achieved using open wire construction (id.). The Companies added that the existing 13.2 kV distribution lines extending southeasterly on West Main Street and northerly on Meadow Road from the substation would not be reconductored under the first phase of the proposed substation upgrade, but may be reconductored under the second phase, as necessary for the Meadow Road substation to continue to meet the requirements of area load growth (Exh. DPU-12).[23]

Under the third and final phase of the proposed substation upgrade, calculated magnetic field levels along the fence perimeter ranged from 3 mG to 58 mG, with the highest expected level at the northerly side of the substation fence, in close proximity to where the second transformer would be located (Exhs. NEP/MEC-8; NEP/MEC-3, at 5; Tr. at 49-50).

With respect to the potential impact of distribution lines up to 1,200 feet from the substation property line under the third and final phase, the Companies stated that the

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[23] The Companies stated that, under phase two, the 13.2 kV distribution system upgrade would include:

(1) the addition of a second 13.2 kV overhead spacer cable distribution line on the existing poles southwesterly along West Main Street;

(2) the use of spacer cable construction, reconductoring of the existing 13.2 kV overhead, open-wire configured, distribution line extending southeasterly along West Main Street from the Meadow Road substation; and/or

(3) the use of spacer cable construction, reconductoring of the existing 13.2 kV overhead, open-wire configured, distribution line extending northerly along Meadow Road from the Meadow Road substation.

The Companies added that other distribution system changes would be likely, including reconductoring other distribution lines in the Spencer area, as well as changing the location of open switches between area feeders (Exh. DPU-12).

cumulative total of six feeder positions at the Meadow Road substation would supply 13.2 kV power to six distribution lines emanating from the substation (Exh. DPU-5). The Companies stated that all such emanating distribution lines would be of double-circuit spacer cable construction, resulting in the lowest practical magnetic field impacts along area roads (id.).

Regarding the existing overhead 69 kV transmission lines, a project to reconductor four connecting sections of the E-5 and F-6 lines[24] -- including considerations to minimize associated magnetic field levels -- is presently in the preliminary engineering stage (id.). The Companies further stated that the remaining 69 kV transmission line (T-20) serves as a backup power supply for the Town of Webster (id.; Exh. NEP/MEC-3, at 3). The Companies added that because the T-20 line normally has no electrical load, and therefore no associated magnetic fields, no magnetic field mitigation measures have been considered for this line (Exh. DPU-5).

3. Hazardous Substances

The Companies stated that two hazardous substances -- non-PCB mineral oil dielectric fluid ("MODF") and a dilute solution of sulfuric acid -- are presently stored at the Meadow Road substation site (Exh. DPU-9). The Companies explained that MODF is presently contained as an insulating fluid in the transformer, circuit breakers, and other miscellaneous equipment, and that dilute sulfuric acid is presently used as an electrolyte in the storage batteries located inside the existing control house (id.). The Companies further stated that, following the proposed substation upgrade, MODF will also be used in some of the electrical

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[24] The Companies stated that the reconductoring project would include the overall length of the E-5 and F-6 lines extending from Millbury, Massachusetts to Buckland, Massachusetts (Exh. DPU-5).

equipment, and that storage batteries containing a sulfuric acid electrolyte would continue to be used in the new control house (id.).

The Companies provided containment plans, for both the existing and proposed substation configurations, designed to prevent releases of hazardous substances to the environment at the Meadow Road substation (id.). In order to provide for temporary MODF containment, the Companies stated that a berm designed to retain MODF for at least 72 hours is presently located along the edges of the substation adjacent to wetland areas (id.). In addition, the Companies stated that the substation yard is and would be covered with trap rock to retard the movement of MODF along the surface of the yard (id.).[25]

The Companies stated that, following the proposed substation upgrade, the largest MODF-filled pieces of equipment would be the two new 24/32/40 MVA power transformers (id.). The Companies explained that in order to temporarily retain MODF for at least 72 hours, each new transformer would be installed over a pit lined with several layers of fabric and compacted soil, and filled with crushed stone (id.). The Companies further stated that each pit would be designed to temporarily retain at least 120 percent of the volume of MODF used in each transformer (id.). The Companies added that the new transformers would be equipped with low-MODF level alarms which send a trouble signal if a significant quantity of MODF leaks from a transformer (id.).

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[25] The Companies stated that a spill prevention, containment and countermeasures plan has been developed for the site and is on file in the existing control house (Exh. DPU-9). The Companies further stated that the electrical equipment at the Meadow Road substation is inspected and maintained at regular intervals (id.).

With respect to preventing the release of dilute sulfuric acid electrolyte at the Meadow Road substation, the Companies stated that the electrolyte will be contained in storage batteries made of an impact resistant plastic (id.). The Companies explained that each battery will have three self contained cells which prevent electrolyte flow between cells, thereby limiting the volume of electrolyte spilled at any one time to the volume contained in each cell – approximately two gallons (id.). The Companies further stated that batteries are inspected and maintained at regular intervals, and added that in the event of a release, the electrolyte would be contained within the control house (id.).

Regarding the use of pesticides at the Meadow Road substation, the Companies' witness, Mr. Farrell, testified that a spring pre-emergence clearing program is normally done at all of their substations (Tr. at 55-56). The Companies indicated that the Massachusetts Bureau of Pesticide Control ("MBPC") regulates the application and types of herbicides used at their substations (Exh. DPU-10).[26] Mr. Farrell testified that the MBPC issues a list of

[26] The Companies stated that all herbicides used for vegetation control at their substations must have state and federal approval for use (Exh. DPU-10). The Companies further stated that only applicators who are licensed/certified by the state are used to apply the herbicides (id.). The Company added that, as an extra precaution, only herbicides approved by the state for use in public water supply areas are used at their substations (id.).

no-mobility[27] herbicides[28] used for groundwater protection, and added that the Companies use those chemicals at all of their substations (Tr. at 56).[29]

4. Noise

The Companies indicated that there is currently one power transformer in operation at the Meadow Road substation which would ultimately be replaced by two low-noise transformers[30] as part of the proposed substation upgrade (Exh. NEP/MEC-3, attachments RDG-3 through RDG-6). The Companies asserted that, following the proposed substation upgrade, the transformer noise levels calculated at the nearest residences would be significantly below the average nighttime ambient noise level, and therefore should not be detectable (Exh. NEP/MEC-2, at 4, attachment DRS-5; Tr. at 19).

In support, the Companies provided a sound level survey ("sound survey") that assessed the impact of the proposed project on the two residences closest to the proposed low-noise, 24/32/40 MVA transformer(s), before and after installation (id.). Regarding the two closest residences, the Companies indicated that one is located easterly at approximately

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27 The Companies indicated that the term "no-mobility" refers to an herbicide's inability to travel through the soil to which it is applied (Tr. at 57).

28 Mr. Farrell testified that the Companies use the herbicides "Oust" and "Accord" at the Meadow Road substation (Tr. at 56-57). Mr. Farrell explained that Oust is mixed with three ounces of chemical to 100 gallons of water, and Accord is mixed at a four percent solution -- four gallons of chemical to 100 gallons of water (id.).

29 The Companies indicated that Spencer municipal water supply facilities are located along Meadow Road, approximately 2,000 feet northeast of the substation site (Exhs. NEP/MEC-11; DPU-6, att. A1).

30 The Companies stated that the noise level for a standard 24/32/40 MVA transformer is 72 dB (Exh. NEP/MEC-2, attachment DRS-5). The Companies further stated that a low-noise transformer with 10 dB of noise reduction will produce a noise level of 62 dB (id.).

575 feet ("Residence A"), and the other is located north, northeasterly at approximately 1,000 feet ("Residence B") (id.).

The sound survey indicated an average existing ambient nighttime sound level of 42.5 decibels ("dB" or "dBA")[31] in the vicinity of the Meadow Road substation (id.). With operation of the first new low-noise transformer under phase one of the proposed substation upgrade, the Companies estimated that the noise level contribution from the transformer at Residence A would be 25 dBA, approximately 6 dBA less than that from the existing transformer, and 19 dBA at Residence B, approximately 7 dBA less than that from the existing transformer (id.). With operation of the second new 10 dB reduced-noise transformer under the third and final phase, the Companies estimated that the net noise level contribution from the transformers would be 27.5 dBA at Residence A, approximately 3.5 dBA less than that from the existing transformer, and 22.7 dBA at Residence B, approximately 3 dBA less than that from the existing transformer (id.).[32]

5. Visual

Under the proposed substation upgrade, the Companies indicated that the appearance of the Meadow Road substation would change due to changes in both the 69 kV and 13 kV portions thereof, as well as post-upgrade landscaping (Exh. NEP/MEC-2; Tr. at 17-20).

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[31] The Department notes that the term "decibel(s)" or "dB" is a unit of measure of sound pressure level, and further that the designation "dBA" refers to sound pressure levels measured or calculated in decibels, the magnitude of which has been adjusted to the simulated response of the human ear, and referred to as an A-weighted value.

[32] The Petitioners stated that they are committed to the principle that noise from the new low-noise transformer(s) at the Meadow Road substation shall not exceed ambient noise levels at any residence (Exh. NEP/MEC-2, at 4).

With respect to the 69 kV portion of the substation yard, the Companies stated that the existing wooden structures and equipment would be removed and replaced with modern metal structures and equipment (Tr. at 18-19). The Companies stated that the tallest existing structure at the substation is the 42-foot wood pole used to secure the 69 kV feeders (id.). The Companies further stated that, following the upgrade, the tallest structure used to secure the 69 kV feeders would be 40 feet in height (id.). The Companies added that the new 69 kV structures and equipment would occupy the same location inside the substation fence as do the existing 69 kV facilities (id.).

Regarding the 13 kV portion of the substation yard, the Companies stated that in addition to installing the proposed new transformers in phase one and phase three of the proposed substation upgrade, they would move the remaining 13 kV structures and install new structures to accomodate additional distribution feeders (Exh. NEP/MEC-2, at 3). The Companies further stated that they would construct a 20 foot by 20 foot building to contain relays and substation service equipment (id.). The Companies added that the new 13 kV facilities would require an expansion of the fenced area to the east in the direction of Meadow Road (Tr. at 18) (see n. 10, supra).

The Companies' witness, Mr. Shapleigh, testified that the driveway would be relocated as a result of the proposed substation upgrade (id.). Mr. Shapleigh added that the Meadow Road side of the expanded area would be landscaped by planting a row of arborvitaes along the fence line (id. at 19).

6. Other

The Companies indicated that approximately 3,200 square feet of the existing substation yard is located within the Flood Plain District as defined by Section 14 of Spencer's zoning by-laws (Exhs. DPU-8; NEP/MEC-11). The Companies stated that none of the new or relocated equipment in any phase of the proposed substation upgrade would be within the floodplain district as presently designated (id.). However, the Companies stated that they plan to install some concrete and fill within the floodplain district to raise a portion of the existing substation yard (Exh. DPU-8).[33]

V. ANALYSIS AND FINDINGS

NEPCo and MECo are electric companies as defined by G.L. c. 164, § 1, authorized to generate, distribute and sell electricity. NEPCo, D.P.U. 92-270, at 1-2 (1994); Massachusetts Electric Company, D.P.U. 92-232, at 17 (1994). Accordingly, the Companies are authorized to petition the Department as public service corporations for the determinations sought under G.L. c. 40A, § 3, in this proceeding.

G.L. c. 40A, § 3, authorizes the Department to grant to public service corporations exemptions from local zoning ordinances or by-laws if the Department determines that the exemption is required and finds that the present or proposed use of the land or structure is reasonably necessary for the convenience or welfare of the public. With respect to the

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[33] The Companies stated that following the completion of a detailed substation grading design plan, they would seek a special permit in accordance with Section 14.7 of Spencer's zoning by-laws (Exh. DPU-8). The Companies added that they would also seek an Order of Conditions from the Spencer Conservation Commission for the proposed grading construction within the 100 year floodplain district (id.). Therefore, for purposes of this proceeding, the Department does not consider such grading construction as part of the Companies' proposed substation upgrade.

Companies' petition pursuant to G.L. c. 40A, § 3, the Companies seek exemptions from the operation of sections 4, 4.1.2, 5, and 13 of the zoning by-laws of the Town of Spencer. Section 4 and subsection 4.1.2 would prohibit alterations of non-conforming buildings or uses in the R-22.5 and R-45 residential districts in which the proposed project would occur; Section 5 would prohibit any uses by a public utility in said residential districts; and Section 13 would prohibit alterations of non-conforming uses in an aquifer protection overlay district in which the Meadow Road substation is located. Based on its review, the Department concludes that these sections of the by-laws could impede construction and implementation of the Companies' proposed substation upgrade. Therefore, the Department finds that the Companies' proposed substation upgrade requires the petitioned exemptions from the operation of said sections of the zoning by-laws of the Town of Spencer.

However, the Department notes that the Companies' zoning exemption for the substation addresses a total of three separate phases of construction, the first phase, scheduled to commence approximately nine months following a Department approval, the second phase, expected to commence by the year 2000, and the third and final phase, predicted to commence by the year 2010. The components of the first and second phases have been detailed by the petitioners with both phases to be constructed within an approximate five year time frame. The components of the third and final phase, while detailed by the petitioners, are to be constructed in stages, likely to begin at least 15 years from now as determined by the need for load in the area. Thus, regarding the third and final phase of the proposed substation upgrade, the Department notes that there is a reasonable possibility that available technologies, load-growth patterns, and environmental

considerations, as well as the petitioners' objectives, could be different when that phase of the proposed substation upgrade is necessary – a time which itself could deviate significantly from when it is now predicted to occur. In the past, the Department has declined to issue approvals for such long-term phases associated with electrical substation upgrades. New England Power Company, D.P.U. 92-255 (1994). Therefore, regarding the third and final phase of the proposed substation upgrade, the petitioners would need to obtain the necessary zoning approvals or, within a reasonable timeframe relative to the date of project necessity, request a separate zoning exemption from the Department.

The petitioners, should they file a zoning exemption request for the third and final phase, would be afforded the opportunity to reintroduce and update, as necessary, record information in this proceeding, and reference applicable Department findings contained herein and elsewhere, as appropriate, to facilitate an expeditious and consistent Departmental decision regarding such request. Accordingly, in the following paragraphs, the Department's analysis, findings, and orders shall be appropriately confined to the first and second phases as described in Section IV, supra.

Next, under G.L. c. 40A, § 3, the Department examines whether the Companies' proposed use of the land and structures as set forth in their petition is reasonably necessary for the convenience or welfare of the public. With respect to the need for, and the public benefits of, the proposed facility, the Companies have established that the proposed facility will provide benefits as a result of improved reliability in the greater Spencer area, specifically the ability of the transmission and distribution system elements serving the Spencer-Leicester-Brookfields-Oakham-New Braintree service area to operate within their

respective capabilities. In addition, the record indicates that the petitioners evaluated reasonable alternatives to the proposed project in the process of developing a strategy to supply their service territory with a reliable and efficient supply of electric power.

The record also indicates that the Companies have considered possible environmental and land use impacts of the proposed Meadow Road substation upgrade that may be of concern to the surrounding community, including construction and traffic, EMF, noise, visual, and possible discharge of pollutants to the ground. The Department finds that although the petitioners plan to rely upon the Meadow Road substation to provide an increasing level of electric power to the surrounding community, potential magnetic field impacts to area residences and businesses have been minimized due to component relocations at the substation and consideration of the wiring techniques utilized to enable distribution from the substation to the surrounding area.[34] The record further indicates that, although the proposed substation upgrade is likely to have only a minor visual impact on the surrounding community, the Companies have nonetheless developed a landscaping plan to help screen the Meadow Road substation from its closest abutters. In addition to the landscaping plan, the Companies have stated that they will enact a number of mitigation

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[34] The Department notes that the first phase of the proposed substation upgrade would not result in any increases in magnetic field levels at area residences or businesses, except those along West Main Street southeasterly from the substation where an existing distribution line with open-wire construction would remain in service. The Department further notes that, should continued load growth along that section of West Main Street warrant, the Companies would replace the existing open-wire-constructed distribution line with a spacer-cable distribution line as part of phase two (see n. 23, supra). Given record evidence that spacer-cable construction reduces magnetic field levels, it is likely that such a line replacement would mitigate the estimated phase one increase in magnetic field southeasterly from the substation, as well as help minimize future magnetic field levels in all surrounding areas.

measures, including: (1) confining construction activities at the substation to normal working hours whenever possible; (2) utilization of a replacement transformer with a sound level rating 10 dB below the standard level of such a device; and (3) the use of a transformer cooling fluid collection device under the new 24/32/40 MVA transformer, as well as impact-resistant batteries and a spill prevention and containment plan, to help prevent soil contamination.

Thus, with implementation of the mitigation measures proposed by the Companies supra, and those required in Section VI, infra, the Department finds that the general public interest in upgrading the Companies' Meadow Road substation to supply electric power to the Town of Spencer and the surrounding areas outweigh the minimal impacts of the Companies' proposed project on the local community. Further, the Department finds that the proposed use of the land and structures as set forth in their petition are reasonably necessary for the convenience or welfare of the public.

VI. ORDER

Accordingly, after due notice, hearing and consideration, it is hereby

ORDERED: That the Companies' petition be allowed in part, and that the proposed substation upgrade and related facilities, referred to as the first and second phases, as described in the Companies' exhibits on file with the Department, be exempt from the operation of the following sections of the zoning by-laws of the Town of Spencer, pursuant to G.L. c. 40A, § 3, to the extent that the upgrade and related facilities are used for electric power transmission purposes:

Section 4 of the zoning by-laws of the Town of Spencer, Subsection 4.1.2; Section 5 of the zoning by-laws of the Town of Spencer; and Section 13 of the zoning by-laws of the Town of Spencer; and it is

FURTHER ORDERED: That the Companies shall comply with the following requirements:

(1) That the Companies shall implement all mitigation measures proposed by the Companies in this proceeding;

(2) That the Companies shall file with the Chief of the Spencer Fire Department, and any other applicable town officials, an amended spill prevention, containment and countermeasures plan, which shall include all mitigation measures proposed by the Companies in this proceeding for the purpose of preventing releases of hazardous substances;

(3) That the Companies shall take all necessary measures to ensure that, during construction, all fill material is clean and free from hazardous materials and construction debris, and that, upon completion of the proposed construction, the Meadow Road substation site is clear of all construction debris, including any site preparation and excavation debris;

(4) That the Companies shall take all necessary measures to preclude unauthorized entry into the Meadow Road substation, both during and after construction hours;

(5) That the Companies shall take all necessary measures to ensure that any disruptions to local traffic, due to the construction at the Meadow Road substation, are minimized to the greatest extent possible; and

(6) That the Companies shall take all necessary measures to ensure that construction equipment and materials do not arrive at the Meadow Road substation site before 7 a.m. on any day; and it is

FURTHER ORDERED: That the Companies notify the Department of any significant changes in the planned timing, design or environmental impacts of the proposed project as described above as they relate to the first and second phases of the proposed substation upgrade; and it is

FURTHER ORDERED: That the Companies shall obtain all other governmental approvals necessary for this project before its construction commences; and it is

FURTHER ORDERED: That the Secretary of the Department shall transmit a certified copy of this Order to the Clerk of the Town of Spencer; and that New England Power Company and Massachusetts Electric Company jointly serve a copy of this Order upon the Conservation Commission, Planning Board, and Town Selectmen of the Town of Spencer within five business days of its issuance and shall certify to the Secretary of the Department within ten business days of its issuance that such service has been accomplished.

By Order of the Department,

_____
Kenneth Gordon, Chairman

_____
Mary Clark Webster, Commissioner

Appeal as to matters of law from any final decision, order or ruling of the Commission may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the Order of the Commission be modified or set aside in whole or in part.

Such petition for appeal shall be filed with the Secretary of the Commission within twenty days after the date of service of the decision, order or ruling of the Commission, or within such further time as the Commission may allow upon request filed prior to the expiration of twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the Clerk of said Court. (Sec. 5, Chapter 25, G.L. Ter. Ed., as most recently amended by Chapter 485 of the Acts of 1971).